O.O.Pokutnyi

Turing bifurcation for boundary value chemical problems

[1] *Institute of Mathematics, Kyiv, Ukraine*
E-mail: lenasas@gmail.com, oleksandermathematik@mail.ru

The report is devoted to obtaining the necessary and sufficient conditions for the existence of solutions of the following boundary value problem

$$\frac{\partial x}{\partial t} = D_x \frac{\partial^2 x}{\partial r^2} - x = (D_x \frac{\partial^2}{\partial r^2} - 1)x, \frac{\partial y}{\partial t} = D_y \frac{\partial^2 y}{\partial r^2} - \varepsilon x^2 y \tag{1}$$

with boundary conditions

$$\ell_1 x(\cdot) = \alpha_1, \ell_2 y(\cdot) = \alpha_2, \tag{2}$$

where ℓ_1, ℓ_2 are linear operators.

Such model is a modification of Turing bifurcation model [1, p.122-124]. The most important critical periodic case will be considered. Equation for generating constant will be constructed.

Considering boundary value problem can be rewrite in the following operator form

$$\frac{dz}{dt} = Az + \varepsilon R(z), \tag{3}$$

$$\ell z(\cdot) = \alpha, \tag{4}$$

where $z = (x, y)^T$, $\alpha = (\alpha_1, \alpha_2)^T$, $\ell = (\ell_1, \ell_2)^T$.

The main results are applications of the obtained by authors results in [2]. Resonance case is connected with chaotic behavior [1, p.58]. Simple dynamic movement is violated by resonances.

[1] *Prigogine I.* From being to becoming: time and complexity in the physical sciences (in Russian): Moscow, Science. - 1985. - 326 p.

[2] *Pokutnyi O.O.* Representation of the solutions of boundary-value problems for the Schrodiner equation in a Hilbert space *Journal of Mathematical Sciences,* **No 6, vol.205**, (2015), p. 821-831.